

UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION

CIRCULAR No. 258

MARCH, 1923

THINNING DECIDUOUS FRUITS

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The deciduous fruits of California are famed for their excellence. To maintain this reputation in view of the increasing tonnage, it is necessary to give careful attention to all the factors that combine to make a perfect product. Size, color, texture and flavor are the chief points sought for and these taken together go to make up the somewhat elusive term known as quality.

Thinning the immature fruit is one of the most essential orchard operations because crowded fruit cannot size properly and neither will the color, texture and flavor be of the best. Considerable thinning is done when the trees are pruned. These two operations are therefore so closely related that one cannot be discussed without a consideration of the other.

Little experimental data exist for guidance in thinning. Most growers, however, have demonstrated to their satisfaction that the operation pays. This is particularly true with apricots, peaches and shipping plums. It is the aim of this circular to present as briefly as possible certain general considerations as well as practical suggestions for the carrying out of the work.

SPECIFIC RECOMMENDATIONS

Almond.—The almond is not generally thinned. However, certain growers report success in removing a portion of the crop shortly after the seeds begin to harden to sell to the "green almond" market, the remaining nuts being left to attain greater size and weight. The practice is not well enough established to recommend its adoption, especially since the outlet for the green fruit is restricted.

Apple.—The fruit-bud of the apple produces a cluster of flowers, several of which usually set fruit, but only one as a rule should be left at thinning time. When there is a heavy set some spurs must be deprived of all their fruit so that when the apples are ripe they will be from four to six inches apart on the branch. Some varieties

such as the Winesap, must be thinned even more severely so that the fruits possibly are not closer than eight or ten inches. When the crop is not so heavy and growing conditions are favorable, then it may be permissible to leave two specimens to the spur.

Apples should generally be thinned immediately after the June drop. However, under certain conditions and with some varieties, notably the earlier maturing sorts, by delaying the thinning for a time it has been found possible to profitably dispose of the immature fruit for culinary purposes and at the same time secure proper development of the main crop.

Specially designed "thinning shears" are on the market for use in apple thinning, but the use of these with most varieties will not prove faster than removal by hand. Furthermore, there is danger of injuring the specimens left with the sharp points of the shears.

Apricot.—Apricots should be thinned so that no two specimens will touch when ripe. Ordinarily the young fruits should not be left closer than from three to five inches on strong shoots and only one fruit to each short spur. Two fruits may be left near together on opposite sides of the branch or even on a short spur, if no other fruits are closer than four or five inches.

In the coast sections where brown rot is prevalent, great care should be taken to see that fruits do not touch when ripening. In clusters of apricots there is often enough moisture between fruits that touch each other, to germinate spores of the brown rot. This disease spreads very quickly from fruit to fruit at ripening time, by contact, and within two or three days the entire cluster may be infected.

Thinning apricots on trees which have been pruned by the so-called "long system" requires special mention. Such trees ordinarily set a much heavier crop than "short pruned" trees of similar age and therefore require heavier thinning. In some sections apricot trees set fruit on the slender one-year shoots which if left is very likely to produce small, scarred and "fog-marked" specimens. These should all be removed and this is most easily and cheaply accomplished by means of a light pole to the end of which has been fastened twelve or fourteen inches of old rubber hose. The branches may be struck with this hose to knock off the apricots at thinning time without material injury to either branch or buds.

Considerable experience is necessary to determine how heavy the set must be to make a systematic thinning of the apricot orchard economical. Observations seem to indicate that crops up to a certain tonnage will be brought through to maturity with marketable sizes



Fig. 1.—Cluster of apples setting from one fruit-bud. For best results only one fruit should remain after thinning.

without carefully breaking up every cluster and separating adjacent fruits as above recommended. Nevertheless, conservative apricot growers make thinning one of their annual orchard operations.

Table 1 gives the results of a thinning experiment on apricots conducted by V. C. Blanchard of the Agricultural Extension Services in Los Angeles County during the season of 1922.

TABLE 1
HAND THINNING OF APRICOTS
Parmentier orchards, San Fernando Valley, 1922

Pruning Treatment	Thinning	Size	Yield
	Proportion of fruit removed	Fruits per pound	Pounds per tree
Thinned only (long).....	One-half.....	9-10	300
Heavy heading (short).....	Clusters—One-third.....	14-15	240
None.....	None.....	17-18	200
Thinned only (long).....	Terminals only.....	12	(No data)

The lightly pruned trees set very abundantly and at thinning time it was thought desirable to remove approximately one-half of the fruit. That this treatment was advisable is shown by the size of the individual fruits harvested as well as by the total yield. Heavy pruning, resulting in less fruit—all borne in dense clusters—gave less yield and smaller sizes. The smallest fruit and crop was produced by trees receiving neither pruning nor thinning. In the case where a thinning method of pruning was accompanied by the removal of fruit from only the terminal growths, the size of the individual specimens was quite satisfactory. Unfortunately this tree was harvested without the weight of the crop being secured. This latter method of thinning, however, is not to be generally recommended.

Cherry.—The cherry is not thinned.

Peach.—The peach responds most readily of all the deciduous fruits to thinning and is the one fruit which under practically all conditions must be thinned. It has been shown that it takes two two-inch peaches to equal in “green” weight one two-and-a-half-inch peach, and also that when the dried fruit is considered it takes three and three-quarter standard grade Muirs to equal one extra fancy dried Muir. These facts emphasize the importance of securing size.

The common recommendation has been to thin peaches so that the fruits are separated by four to six inches at ripening. However, if two fruits are on opposite sides of a shoot and are far removed from other specimens both may be left. It is probably impractical in most cases to attempt to separate “doubles.” Remove all such if there are enough “singles” to make a crop.



Fig. 2.—Fruits composing this cluster of apricots would have reached better size had one or two specimens been removed at thinning.

Recently Weldon* has submitted figures, collected by the Southern California Cannery Bureau and the California Growers' Association, showing the number of peaches of different sizes necessary to make a ton of fresh fruit. From these facts the author calculates the number of peaches of a given size which must be left on a single tree planted at a certain distance to produce a given tonnage per acre.

TABLE 2
THINNING SCHEDULE

Number of peaches per tree, of $2\frac{1}{4}$ in., $2\frac{1}{2}$ in. and $2\frac{3}{4}$ in., sizes to produce desired tonnage per acre as shown in left hand column, from trees planted the different distances indicated below.

Number of tons per acre desired	20 feet x 20 feet 108 trees per acre			24 feet x 24 feet 75 trees per acre		
	$2\frac{1}{4}$ in.	$2\frac{1}{2}$ in.	$2\frac{3}{4}$ in.	$2\frac{1}{4}$ in.	$2\frac{1}{2}$ in.	$2\frac{3}{4}$ in.
1.....	104	70	54	149	101	77
2.....	208	140	108	298	202	154
3.....	312	210	162	447	303	213
4.....	416	230	216	596	404	308
5.....	520	350	270	745	505	385
6.....	624	420	324	894	606	462
7.....	728	490	378	1043	707	539
8.....	832	530	432	1192	808	616
9.....	936	630	483	1341	909	693
10.....	1040	700	540	1490	1010	770

The orchardist can only after long years of experience accurately estimate the tonnage trees of a certain age and condition should produce. Reducing the number of peaches on a tree to a given number will not assure the grower that a given size will be reached. Age of trees, soil and moisture conditions, pest control and pruning treatment all must be taken into account when utilizing any such method as outlined above.

Pear.—Pears are not generally thinned in California. It would seem, however, that where conditions are not entirely ideal that the same considerations should hold with the pear as with the apple. In sections where the fruit which ripens first is shipped, it has been the common experience that the removal of the earlier maturing specimens helps materially in sizing the balance of the crop. This fact is especially true of the Bartlett variety. Very large sizes are undesirable for either shipping or canning and should be dried.

* Geo. P. Weldon, A New Idea in Peach Thinning. Bull. No. 5, Feb., 1923, Chaffey Junior College, Ontario, Calif.



Fig. 3.—Ideal distribution of apricots on small one-year-old fruiting shoot.

Plum and Prune.—Plums, especially those intended for “green” shipment, should always be thinned. This is particularly true of the Japanese varieties which normally fruit so abundantly. Plums should ordinarily be separated from one to three inches when fully mature. Varieties belonging to the European species will as a rule size better in dense clusters than will the Japanese sorts.

It has not been found economical to do any thinning of plum varieties utilized for prune making other than that accomplished at the annual pruning. There is, however, one possible exception to the statement just made, namely, the Sugar prune. As grown in certain localities, this variety must be thinned to prevent overbearing with resultant breakage of branches—the wood of the Sugar prune being exceedingly brittle—and to offset a decided tendency towards “alternate bearing.”

REASONS FOR THINNING

Thinning may be defined as the removal of a certain portion of the fruit crop from the tree in order to:

1. Improve size, color, texture, flavor and individual uniformity.
2. Prevent breakage of trees by better distribution of crop.
3. Reduce disease and insect injury.
4. Maintain vigor of the tree.
5. Secure more regular bearing.
6. Decrease labor of handling crop.

It has been the common experience of growers, and many actual tests have shown, that where there is a heavy set of fruit the reduction of the number of specimens will as a rule result in better average size, color and uniformity and enhance the general attractiveness of the entire crop.

Frequently, either on account of improper thinning of fruiting wood at the dormant pruning, or an unusually favorable season for fruit setting trees may be so loaded that much breakage will result unless the weight of the crop is reduced by thinning.

Certain diseases and insects flourish where fruit is closely crowded on the branch. In order to control these pests it is necessary to break up the clusters. The codling moth, which causes wormy apples and pears delights in making its entrance where two fruits touch. Brown rot of the stone fruits is more rapidly spread when the fruit hangs in dense clusters or even touches.

Bigelow and Gore* a number of years ago reported the average composition of six varieties of peaches at different stages of growth. The results are given in table 3.

* Bigelow, W. D., and Gore, H. C., U. S. Dept. Agr. Bur. Chem., Bull. 97, 1905.



Fig. 4.—Ideal distribution of apricots when borne on adjacent short spurs.

TABLE 3
AVERAGE COMPOSITION OF SIX VARIETIES OF PEACHES AT DIFFERENT
STAGES OF GROWTH

Stage of growth	Weight of				Total Solids in		
	Peach Grams	Flesh Per cent	Stone Per cent	Kernel Per cent	Flesh Per cent	Stone Per cent	Kernel Per cent
June Drop.....	9.51	64.55	32.50	2.94	14.77	9.37	6.89
Stone Hardened....	16.75	71.54	25.82	2.89	16.97	27.35	7.54
Market-ripe.....	73.59	92.49	6.86	0.65	14.04	66.94	44.78

A study of the foregoing figures discloses several interesting facts. The proportion of total solids in the pits (stone and kernel) of the peach, even at a relatively early stage of development, is comparatively great. From this, it may probably be safely concluded that the bringing to maturity of a large number of pits is a greater drain upon the tree than the ripening of a smaller number of fruits, which on account of larger size, aggregate the same weight. It is a matter of common knowledge that the size of the pit in the stone fruits varies very little between large and small specimens of the same variety. Inasmuch as the solids in the pits are proportionately much less before the stone hardens it would seem desirable to thin as soon as possible after all natural shedding of superfluous fruits has stopped. These facts would seem to indicate that the vigor of the tree may be maintained by judicious thinning.

Many statements have in the past been made to the effect that thinning, by not allowing all spurs to produce any one season, will prevent the alternation of bearing which seems to be the fixed habit of some apple and pear varieties. Carefully checked experiments have shown this assumption to be incorrect, except in so far as a heavy crop one year tends to deplete the resources of the trees for the following season. With the stone fruits a very heavy production one year is almost always followed by a light crop the next unless utmost care is taken with all orchard operations.

Thinning so as to decrease the number of fruits to be handled at harvest time materially reduces picking, grading and packing costs. Lessening the number of fruits does not necessarily mean less tonnage. Thinning is apt to result in considerable increase in size. The canners of California have adopted as a slogan, "one two-and-a-half-inch peach weighs as much as two two-inch peaches."

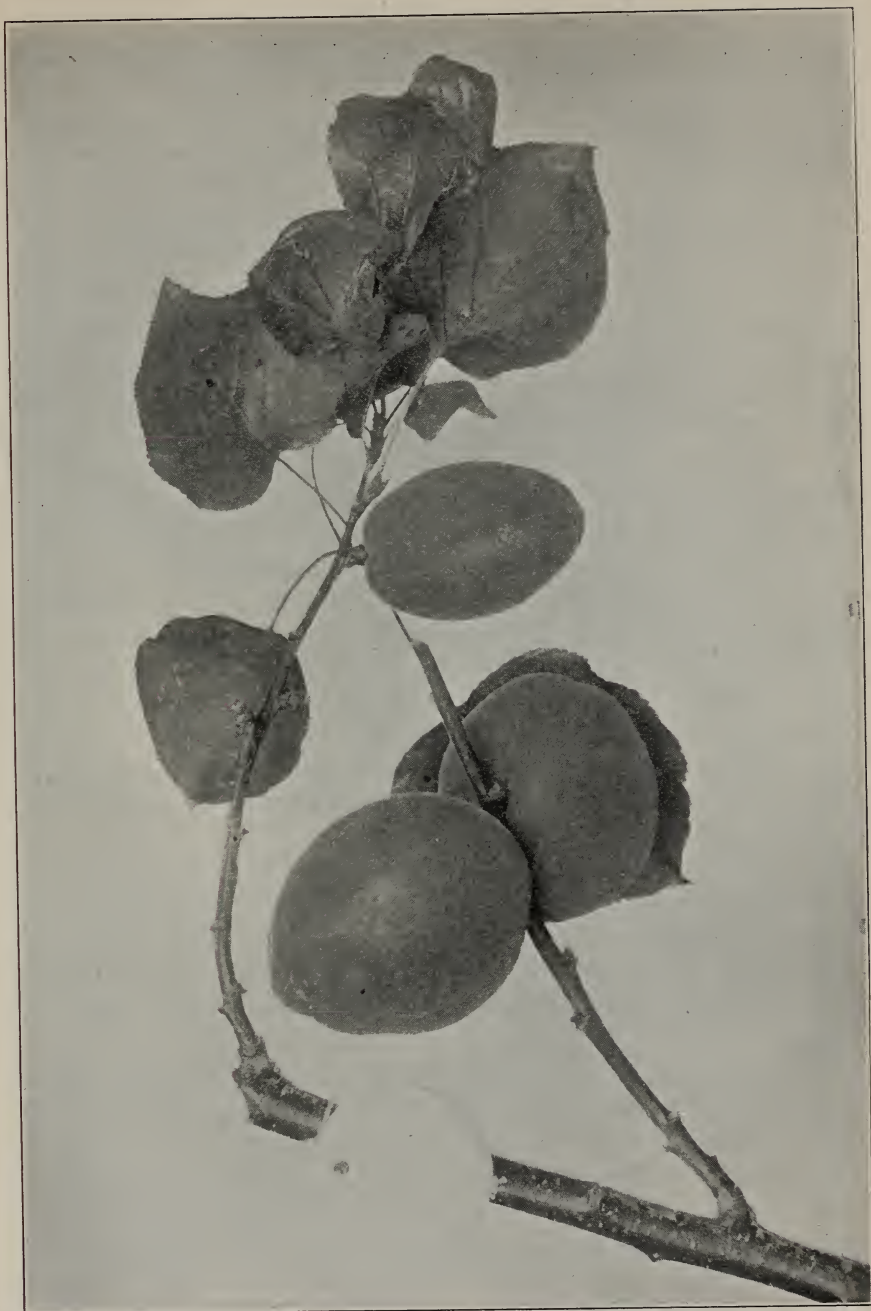


Fig. 5.—Apricots on opposite sides of spur which should reach good marketable size. Note distance from other fruit.

GENERAL CONSIDERATIONS

The fruit tree utilizes all its energies in:

1. Wood growth.
2. Fruit and seed production.
3. Fruit- and leaf-bud formation.
4. Manufacture and storage of reserve food materials.

Of the different orchard operations which modify these life processes probably no other one has such a profound and immediate influence as pruning. Any pruning system (such as the one which has been so widely recommended by the University of California during the last few years), which results in a greater storage of plant food reserves, the formation of more fruit-spurs and fruit-buds, and consequent modification of new wood growth, is most intimately associated with the question of fruit thinning. In fact, the thinning of the fruit is an integral part of the pruning system.

Plant food materials before being assimilated by the tree in carrying on its activities, must be transformed in the leaves into rather complex plant foods and there is some evidence to show that much of this food is utilized near the point of manufacture. Having this fact in mind, it may be argued that more fruit can be brought to a satisfactory maturity on shoots or spurs having a comparatively large leaf area. Field observation offers convincing proof of the correctness of this assumption.

Young trees, especially with a vigorous vegetative growth, tend to set fewer fruits than slower growing mature ones, and as a rule need less thinning. There is likewise a distinct varietal difference in the ability of the various sorts to size their crops. The Winesap variety of apple, for example, needs far more thinning than the average.

Soil and moisture conditions must be favorable. Thinning cannot be made to atone for poor cultural treatment. Naturally more fruit may be left under ideal conditions than where there is a deficiency in either soil moisture or fertility. Also it should be stated in passing that during the early development of the fruit, should there be a lack of available moisture in the soil, the leaves have the ability of withdrawing water from the fruit. This condition may readily proceed so far that the fruit is unable to recover even with copious irrigations at a later date. Keep the soil moisture at the optimum at all times.

Much of the thinning work may be accomplished at the annual dormant pruning, at less expense, by the judicious selection and distribution of fruiting wood. With certain fruits, however, even with the most careful pruning, a portion of the fruit must be removed after the first and second "drops" or the trees will tend to overbear. Attempts at thinning the fruit at pruning time in some localities where there is more or less of a frost hazard, may result, in unfavorable seasons, in greatly reduced crops.

It has already been pointed out that thinning is best done as early in the spring as the habit of natural dropping permits. This will vary for different localities and fruits. The so-called "June drop" in reality in many fruit sections of California takes place in April or May. A satisfactory explanation of this phenomenon has yet to be proved experimentally.

The actual operation of thinning is accomplished in various ways in the different fruit districts of the state. The only satisfactory way is removal of the undesirable fruit with the hand, never by shaking or knocking with a pole. By the latter methods fruit-spurs are broken, even spacing of fruit left is impossible, and no discrimination can be made between good and bad specimens. Fruit made unsalable by insect injuries, plant diseases, frost and mechanical malformations can be removed when thinning is done by hand; otherwise many of these specimens will remain on the trees until harvest and the handling of these culls will impose a further burden at a very busy season.



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